

## WHAT IS CLAIMED IS:

1. A micromachined moving device comprising:  
fixed electrode means;  
moving electrode means disposed opposite at a distance from said fixed  
5 electrode means, said moving electrode means being resiliently supported; and  
an AC drive circuit connected to said fixed electrode means and said  
moving electrode means, for generating an AC drive voltage for application  
across said fixed electrode means and said moving electrode means in response  
to an input control signal;  
10 wherein said AC drive circuit responds to said input control signal to  
apply said AC drive voltage across said fixed electrode means and said moving  
electrode means to drive said moving electrode means by electrostatic force  
into and out of contact with said fixed electrode plate.
2. The device of claim 1, wherein said fixed electrode means has on its top at  
15 least four minute projections formed opposite at a distance from said moving  
electrode means, and an insulating film formed all over the top surface of said  
fixed electrode means including said minute projections.
3. The device of claim 1, wherein said fixed electrode means has an  
insulating film formed all over its top surface, and a fixed electrode formed on  
20 said insulating film opposite said moving electrode means.
4. The device of claim 3, wherein said fixed electrode means has on its  
top at least four minute projections covered with said insulating film and  
protruding upwardly of said fixed electrode.
5. The device of any one of claims 1 to 4, wherein said AC drive circuit  
25 includes an oscillator for generating a sinusoidal, rectangular or triangular AC  
signal of periodically varying polarity as at least part of said AC drive voltage.
6. The device of claim 5, wherein said AC drive circuit includes:

a variable gain amplifier for amplifying said AC signal from said oscillator and for outputting said AC drive voltage; and

a control voltage generator responsive to said input control signal to generate a gain control signal which controls the gain of said variable gain

5       amplifier to amplify said AC signal to a first voltage for attracting said moving electrode means into contact with said fixed electrode means for a predetermined period and thereafter amplify said AC signal to a second voltage lower than said first voltage for holding said moving electrode means in contact with said fixed electrode means until said input control signal is turned

10      OFF.

7. The device of claim 5, wherein said AC drive circuit includes:

a first amplifier for amplifying said AC signal from said oscillator to a first voltage for attracting said moving electrode means into contact with said fixed electrode means;

15       a second amplifier for amplifying said AC signal from said oscillator to a second voltage lower than said first voltage for holding said moving electrode means in contact with said fixed electrode means;

19       a selector for any one of the output from said first amplifier, the output from said second amplifier and the ground voltage and outputting the selected

20      input as said AC drive voltage; and

25       a control voltage generator responsive to said input control signal to generate a select control signal for controlling said selector so that said selector selects the output from said first amplifier for a predetermined period and thereafter selects the output from said second amplifier and select said ground voltage when said input control signal is turned OFF.

8. The device of claim 5, wherein said AC drive circuit includes:

a DC power supply for outputting a first DC voltage for attracting said

moving electrode means into contact with said fixed electrode means;

an amplifier for amplifying said AC signal from said oscillator to a second AC voltage lower than said first DC voltage for holding said moving electrode means in contact with said fixed electrode means;

5 a selector for selecting any one of the output from said DC power supply, the output from said amplifier and the ground voltage and outputting the selected input as said AC drive voltage; and

a control voltage generator responsive to said input control signal to generate a select control signal for controlling said selector so that said selector

10 selects the output from said DC power supply for a predetermined period, thereafter selects the output from said amplifier and selects said ground voltage when said input control signal is turned OFF.

9. The device of claim 5, wherein said AC drive circuit includes:

a DC power supply for outputting a DC voltage for attracting said 15 moving electrode means into contact with said fixed electrode means;

a variable gain amplifier for amplifying said AS signal from said oscillator and outputting an AC voltage for holding said moving electrode means in contact with said fixed electrode means;

20 a summing amplifier for adding together the DC voltage from said DC power supply and the output voltage from said variable gain amplifier and outputting the added voltage as said AC drive voltage; and

a control voltage generator responsive to said input control signal to generate a first control signal for driving said DC power supply to output said DC voltage for a predetermined period and a second voltage control signal for 25 controlling the gain of said variable gain amplifier so that said variable gain amplifier outputs 0 V for said predetermined period and thereafter outputs an AC voltage for holding said moving electrode means in contact with said fixed

electrode means.

10. The device of claim 5, wherein said AC drive circuit includes:
  - a DC power supply for outputting a DC voltage for attracting said moving electrode means into contact with said fixed electrode means;
  - 5 a variable gain amplifier for amplifying said AS signal from said oscillator and outputting an AC voltage for holding said moving electrode means in contact with said fixed electrode means;
  - a summing amplifier for adding together the DC voltage from said DC power supply and the output voltage from said variable gain amplifier and
  - 10 outputting the added voltage as said AC drive voltage; and
  - a control voltage generator responsive to said input control signal to generate a first control signal for driving said DC power supply to output said DC voltage for a predetermined period and a second voltage control signal for controlling the gain of said variable gain amplifier so that said variable gain
  - 15 amplifier outputs an AC voltage for holding said moving electrode means in contact with said fixed electrode means.